AMENDMENTS

Kindly amend the application as follows.

In the claims:

Claim 1 (currently amended)

1. A self-monitoring flow-through heater, comprising:

(a) a passageway providing a flow conduit; [and]

(b) a wire disposed in the passageway for heating and monitoring temperature of a fluid flowing through the tube; the wire having a high temperature coefficient of resistance, so that monitoring voltage across and/or current through the wire measures mean temperature of the wire and thereby indirectly of the fluid in the passageway;

(c) a current-sensing first resistor, the resistor being electrically connected in series with the wire;

(d) a voltage regulator and a first potentiometer, for applying a constant voltage across the wire, voltage drop across the first resistor being directly proportional to the current flowing through the wire, the sensed voltage across the resistor decreasing as the mean temperature of the wire increases, the wire thereby functioning as a temperature sensor;

(e) an operational amplifier, for amplifying the voltage sensed across the first resistor;

(f) an adjustable voltage divider comprising a fixed second resistor, a second potentiometer, and a comparator, for comparing the amplified voltage with a set-temperature voltage generated by the adjustable voltage divider; and

(g) a first switch, to provide an additional path to ground for the voltage regulator through a third potentiometer, when the set temperature is reached and the comparator goes high, turning on the first switch, thereby lowering the output voltage applied to the wire by the voltage regulator, whereby the voltage applied to the wire lies between two adjustable values controlled by the first and third potentiometers.

Claims 2 - 4 (cancelled)

Claim 5 (new)

5. The self-monitoring flow-through heater of claim 1, further comprising:

(h) a light-emitting diode; and

(i) a second switch;

for registering point at which the set temperature is reached.

Claim 6 (new)

6. A self-monitoring flow-through heater, comprising:

(a) a passageway providing a flow conduit; and

(b) a wire disposed in the passageway for heating and monitoring temperature of a fluid flowing through the tube; the wire having a high temperature coefficient of resistance, so that monitoring voltage across and/or current through the wire measures mean temperature of the wire and thereby indirectly of the fluid in the passageway;

the wire being coaxially disposed in the passageway, to provide a minimum operating volume.

Claim 7 (new)

7. A self-monitoring flow-through heater, comprising:

(a) a passageway providing a flow conduit; and

(b) a wire disposed in the passageway for heating and monitoring temperature of a fluid flowing through the tube; the wire having a high temperature coefficient of resistance, so that monitoring voltage across and/or current through the wire measures mean temperature of the wire and thereby indirectly of the fluid in the passageway;

the wire being bare, to catalyze certain chemical reactions.

Claim 8 (new)

8. The self-monitoring heater of claim 7, wherein the wire is made of platinum.

SUMMARY OF THE OFFICE ACTION

Claims 1 – 4 are pending in the application.

Claims 1 – 4 are rejected.

The drawings filed on 18 May 2004 are accepted by the Examiner.

THE CLAIMED INVENTION

The present invention provides a self-monitoring flow-through heater comprising (a) a passageway providing a flow conduit; (b) a wire disposed in the passageway for heating and monitoring temperature of a fluid flowing through the tube; the wire having a high temperature coefficient of resistance, so that monitoring voltage across and/or current through the wire measures mean temperature of the wire and thereby indirectly of the fluid in the passageway; (c) a current-sensing first resistor, the resistor being electrically connected in series with the wire; (d) a voltage regulator and a first potentiometer, for applying a constant voltage across the wire, voltage drop across the first resistor being directly proportional to the current flowing through the wire, the sensed voltage across the resistor decreasing as the mean temperature of the wire increases, the wire thereby functioning as a temperature sensor; (e) an operational amplifier, for amplifying the voltage sensed across the first resistor; (f) an adjustable voltage divider comprising a fixed second resistor, a second potentiometer, and a comparator, for comparing the amplified voltage with a set-temperature voltage generated by the adjustable voltage divider; (g) a first switch, to provide an additional path to ground for the voltage regulator through a third potentiometer, when the set temperature is reached and the comparator goes high, turning on the first switch, thereby lowering the output voltage applied to the wire by the voltage regulator, whereby the voltage applied to the wire lies between two adjustable values controlled by the first and third potentiometers; and (h) a light-emitting diode and (i) a second switch, for registering point at which the set temperature is reached. The specific resistivity of the wire is greater than about one-half ohm-meters. The temperature coefficient of resistance of the wire is greater than about two-tenths percent per degree Centigrade. The bare wire is coaxially disposed in the passageway, to provide a minimum operating volume, and to catalyze certain chemical reactions.

SCOPE OF THE PRIOR ART

U.S. Patent (Pat.) 6,080,973 to Thweatt, Jr. discloses an electric water heater that includes a polymeric body having an elongated hollow, an inlet opening, and an outlet opening in communication with the hollow, for flowing water to pass therethrough. An electric resistance heater having a heating element of a material exhibiting a positive temperature coefficient of resistance is disposed in the hollow of the polymeric body, and is in heat-transfer communication with water flowing through the hollow. An electrical source supplies electrical power to the heating element to generate heat. A controller senses current flow through the heating element and determines a resistance-related value, such as current or resistance of the heating element. The controller also determines a first derivative of the resistance-related value over a period of time, and controls power supply to the heating element as a function of the first and second derivatives and/or absolute resistance.

U.S. Pat. 4,736,091 to Moe discloses an integral sensor controller for an electrical heater. The heater is constructed from materials such as nickel, balco, platinum, alumel, or like materials which have an appreciable positive temperature coefficient of resistivity. The resistance-versus-temperature characteristic of the heater acts as the temperature sensor. A low-level direct current provides a sensor voltage which is compared to a set-point voltage for switching the heater power through a transistor. The relationship of the sensor voltage to the set-point voltage is compared by a comparator which is subsequently used to toggle flip-flops for switching of the heater power. Circuity is provided for protection against heater short circuits.

THE EXAMINER'S RATIONALE

In rejecting claims 1 – 4 under 35 U.S.C. 102(b) over U.S. Pat. 6,080,973 to Thweatt, Jr., the Examiner states as follows:

Thweatt discloses a self monitoring heater comprising a passageway providing a flow conduit, and a wire disposed in the passageway, for heating and monitoring temperature of a fluid flowing through the tube; the wire having a high specific resistivity and a high temperature coefficient of resistance, so that monitoring voltage across and/or current through the wire measures mean temperature of the wire and thereby indirectly of the fluid in the passageway. With respect to claim 4, it is well established that a recitation with respect to the manner in which an apparatus is intended to be employed, i.e. functional limitation, does not impose any structural limitation upon the claimed apparatus which differentiates it from a prior art reference disclosing the structural limitations of the claim. In re Pearson, 494 F.2d 1399, 181 USPQ 641 (CCPA 1974); In re Casey, 370 F.2d 576, 152 USPQ 235 (CCPA 1967); In re Otto, 312 F.2d 937, 136 USPQ 458 (CCPA 1963). Where the prior art reference is inherently capable of performing the function described in a functional limitation, such a functional limitation does not define the claimed apparatus over such prior art reference, regardless of whether the prior art reference explicitly discusses such capacity for performing the recited function. In re Ludtke, 441 F.23 660, 169 USPQ 563 (CCPA 1971). In addition, where there is no reason to believe that such functional limitations may be an inherent characteristic of the prior art reference, Applicant is required to prove that the subject matter shown in the prior art reference does not possess the characteristic relied upon. In re Spada, 911 F.2d 705, 15 USPQ2d 1655 (Fed. Cir. 1990); In re King, 801 F.2d 1324, 1327, 231 USPQ 136, 138 (Fed. Cir. 1986); In re Ludtke, 441 F.2d at 664, 169 USPQ at 566 (CCPA 1971).